

GCF-NOCC Reconfiguration

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The equipment and computer programs in the Network Operations Control Center (NOCC) and the Ground Communications Facility's (GCF's) Central Communication Terminal at JPL have been rearranged and supplemented to provide an improved operational capability.

The computer portion of the GCF's Central Communication Terminal (CCT) in the basement of the Space Flight Operations Facility was designed and implemented separate from the Network Data Processing (NDP) portion of the Network Operations Control Center (NOCC). These independent designs, implemented at different times, used more computers and programs than an integrated design would have required. The desire to reduce the computer count and to provide an improved operational capability led to the GCF-NOCC reconfiguration effort.

This effort, which was completed in April 1981:

- (1) Requires fewer minicomputers (16 vs 20).
- (2) Requires fewer computer programs (6 vs 8).
- (3) Significantly reduces magnetic tape handling.
- (4) Provides a much improved monitor and control capability.
- (5) Reduces operator requirements and provides the base for a two-operator CCT.

The reconfigured GCF-NOCC is shown in Fig. 1. Digital communications circuits from the Deep Space Communica-

tions Complexes (DSCCs) are routed through circuit switches to the transmission terminal equipment for each circuit. The terminal equipment includes error detection encoding-decoding hardware and distribution amplifiers to directly route wideband data to the MCCC and the DSN's VLBI correlation processors. All DSCC data are contained in standardized blocks which include an address at the beginning of the block plus an error detection code at the end of the block.

Data then flow to the Error Correction and Switching (ECS) processors for routing. There are four ECS processors. Three on-line units share the load, with one hot backup which can be switched on line in a minute or less to replace a failed processor. The ECS processors route the data blocks:

- (1) To the addressee named in the block (usually the MCCC).
- (2) To the Data Records Generation processors if a permanent Intermediate Data Record (IDR) is to be produced.
- (3) To the Network Communications Equipment (NCE).
- (4) Optionally, to a Front End Record (FER) magnetic tape unit driven by the ECS itself.

The Network Communications Equipment (NCE) consists of two processors, a prime and backup, which route blocks to the proper NOCC computers (RTMs and Support). The NCE also routes display data generated by the RTMs to the Digital Display Processor (DDP) which in turn forwards the formatted information to the Video Display Processor (VAP). The VAP drives the network display devices which depict the status of the entire DSN. The DDP and VAP assemblies are each dual units, prime and backup.

The Data Records Generation assembly consists of three on-line and one hot backup unit. Real-time data received from the ECS are subdivided into streams according to spacecraft and data type and then recorded. High-speed streams ($< 3\text{-}4$ kbps) are written on disc while wideband streams are recorded on magnetic tape. Gaps in the data are detected as the real-time stream is recorded. After the tracking pass is complete,

the missing data are recalled from the DSCC, the gaps in the record are filled and a tape-recorded Intermediate Data Record (IDR) is written.

The Central Communications Monitor (CCM) receives status reports from all of the GCF's processors, including the Communications Monitor and Formatter (CMF) machines at the DSSs. The status information is correlated, formatted and presented to Communications Operations personnel. The CCM is also a central control point for all of the GCF computers in the Central Communications Terminal and for the hardware switches.

The reconfigured GCF-NOCC capability was completed in April 1981. The Voyager 2 encounter with Saturn was supported by this new capability which performed as designed.

References

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2. Bremner, D. S., and Hung, C. K., "Ground Communications Facility and Network Operations Control Center Reconfiguration, in *The Deep Space Network Progress Report 42-58*, pp. 108-109, Jet Propulsion Laboratory, Pasadena, Calif., July 1980.

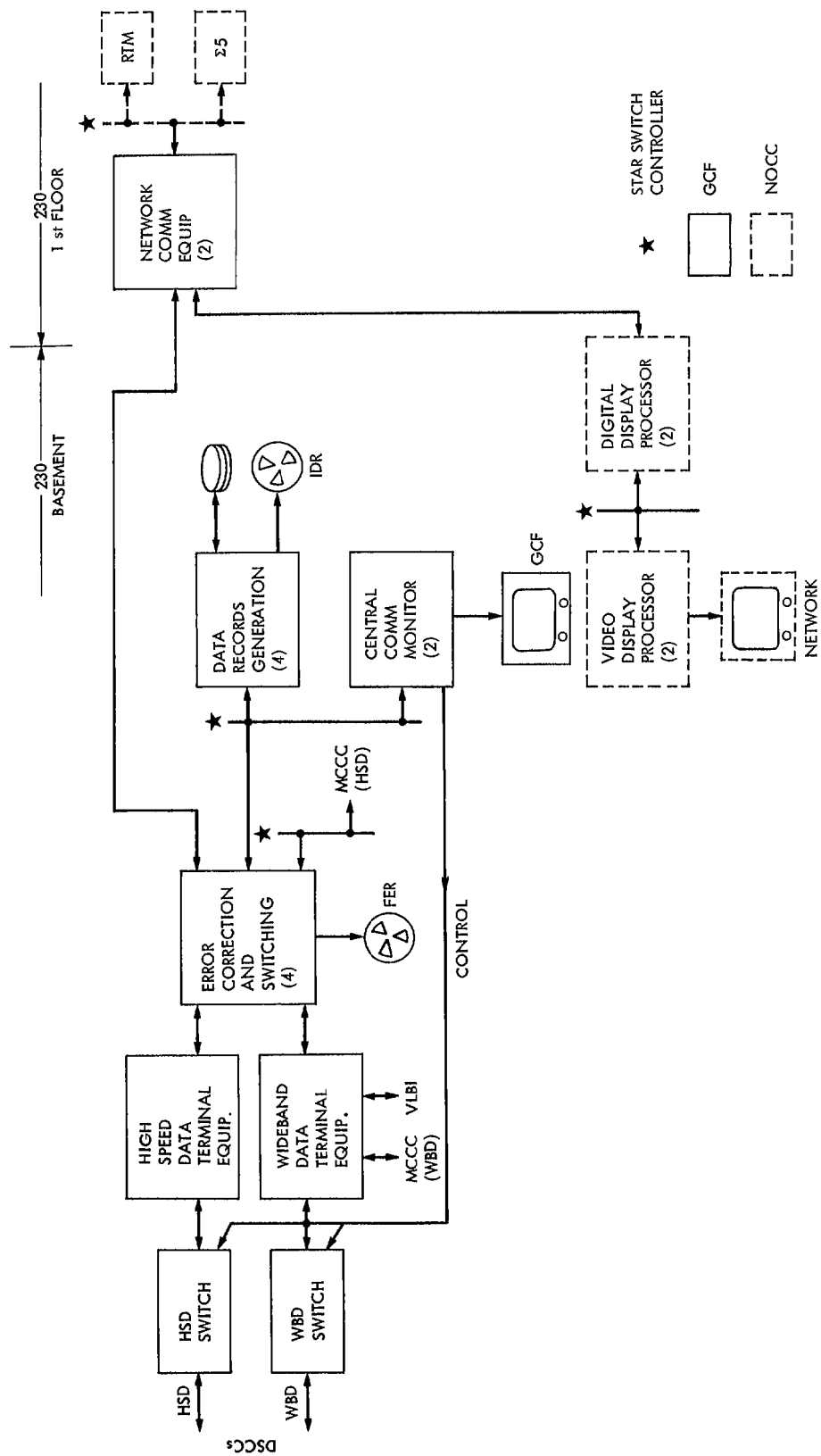


Fig. 1. Reconfigured GCF-NOCC